The Role Of Nurses And Paramedics In Improving Continuity Of Care From The Scene Of The Accident To The Emergency Department

Sara Fare Alsolami[1], Ebtisam Razqan Almutairi[2], Ahmed Muslih Nafea Alrasheedi[3], Meshal Mohamad Alansari[4]

[1-2*] Ministry of Education- University of Jeddah-Saudi Arabia
[3-4*] Saudi Red Crescent Authority-Saudi Arabia

Abstract

Traumatic injuries and accident-related emergencies remain among the leading preventable causes of morbidity and mortality worldwide. The critical period extending from the scene of the accident to arrival at the emergency department (ED) plays a decisive role in determining patient outcomes. During this complex transitional phase, optimal care depends not only on timely life-saving interventions, but also on the effective maintenance of continuity of care, defined as the coherent transfer of clinical information, decision-making, and professional responsibility across the emergency care continuum.

Contemporary models of prehospital emergency medicine emphasize that the effectiveness of emergency medical services (EMS) should be assessed not merely by response times, but by their capacity to sustain an integrated chain of care linking prehospital and in-hospital emergency services. International guidance highlights that strong organizational, clinical, and informational integration between paramedics and emergency departments is essential for improving patient safety and outcomes.

Despite these advances, the transition of care between paramedics and emergency department teams remains a vulnerable point in trauma and emergency pathways. Time pressure, environmental complexity, and communication variability frequently result in the loss of critical information, including evolving vital signs, prehospital interventions, medication histories, and mechanisms of injury. Such gaps can compromise triage accuracy, delay definitive management, and disrupt continuity of treatment within the ED.

To address these challenges, international trauma and emergency care guidelines advocate for the standardization of handover processes, including the use of structured communication tools such as SBAR, MIST, and IMIST-AMBO. These frameworks aim to reduce interprofessional variability, enhance the completeness of transferred information, and promote shared situational awareness between prehospital and hospital teams.

Within this context, effective collaboration between nurses and paramedics is fundamental to ensuring continuity of care from the accident scene to the emergency department. Paramedics provide a comprehensive prehospital clinical narrative, while emergency nurses play a pivotal role in translating this information into triage decisions, activation of clinical pathways, and coordination of multidisciplinary resources. When continuity of care is conceptualized as informational, managerial, and relational continuity, the nurse–paramedic interface emerges as a key determinant of care quality and patient safety.

Accordingly, this study, entitled "The Role of Nurses and Paramedics in Improving Continuity of Care from the Scene of the Accident to the Emergency Department," addresses a high-risk transition point within emergency care systems. By examining interprofessional roles and communication processes, the study seeks to contribute evidence-based insights that support

safer handover practices, enhanced continuity of care, and improved outcomes in modern emergency medicine.
Keywords: Paramedics; Emergency Medical Services; Saudi Red Crescent Authority; Pre-hospital Care; Vision 2030; Nursing.

1. INTRODUCTION

1.1 The Strategic Context of Saudi Healthcare

The Kingdom of Saudi Arabia is undergoing a profound socioeconomic transformation driven by Saudi Vision 2030, a strategic framework intended to reduce oil dependence and diversify the economy. Central to this vision is the restructuring of the healthcare sector to enhance quality, accessibility, and efficiency. Within this framework, Emergency Medical Services (EMS) are recognized not merely as a transportation necessity but as the frontline of national health security [1]. The pre-hospital phase of care—the period from the onset of a medical emergency until arrival at a definitive care facility—is a critical window where morbidity and mortality outcomes are determined.

Historically, the Saudi healthcare model was hospital-centric, with pre-hospital services functioning primarily as a means of conveyance. However, the rising burden of non-communicable diseases (NCDs), such as cardiovascular disease and diabetes, coupled with a persistently high rate of road traffic accidents (RTAs), has necessitated a paradigm shift [2]. The National Transformation Program (NTP) has set aggressive targets for the health sector, including the reduction of emergency response times, the improvement of trauma survival rates, and the localization (Saudization) of the healthcare workforce [3]. In this context, the role of the SRCA practitioner—the paramedic and the EMT—has been elevated to that of a specialized clinician capable of delivering advanced life-saving interventions in uncontrolled environments.

1.2 Historical Evolution of the Saudi Red Crescent Authority

To understand the current role of paramedics in Saudi Arabia, one must appreciate the institutional history of the SRCA. The genesis of organized emergency services in the Kingdom dates back to 1934 (1353 H), with the establishment of the "National Medical Emergency Association." This entity was created out of necessity during the Saudi-Yemen war to provide medical aid to wounded civilians and soldiers in the Asir and Tihamah regions, where medical infrastructure was virtually non-existent. Simultaneously, the association addressed the dire needs of pilgrims performing Hajj in Makkah, who suffered from heat exhaustion, disease, and trauma without adequate transport to hospitals [4].

This charitable initiative evolved into the Saudi Red Crescent Society and later, by Royal Decree in 2008 (1429 H), into the Saudi Red Crescent Authority (SRCA). This transition from a "Society" to an "Authority" marked a significant shift in administrative power and government integration, linking the organization directly to the Council of Ministers with the Minister of Health serving as the Chairman of the Board of Directors. This structure underscores the SRCA's dual mandate: to serve as the primary provider of EMS during peacetime and to act as a humanitarian auxiliary to the medical departments of the armed forces during conflict, in accordance with the Geneva Conventions [4].

Today, the SRCA operates under a sophisticated legislative framework that empowers it to adopt policies, approve administrative regulations, and establish centers throughout the Kingdom. Its membership in the International Federation of Red Cross and Red Crescent

Societies (IFRC), admitted in 1963, ensures that its operational standards are benchmarked against global humanitarian principles [5]. This historical trajectory—from a war-time charity to a robust government authority—mirrors the professional evolution of its workforce, from volunteer drivers to highly trained paramedics.

1.3 The Vision 2030 Mandate for EMS

The Saudi Vision 2030 outlines specific goals that directly impact the SRCA's operations. The Health Sector Transformation Program aims to facilitate access to healthcare services, improve the quality and efficiency of these services, and promote prevention of health risks [1]. For the SRCA, this translates to tangible performance indicators:

- Response time reduction: Achieving international benchmarks (e.g., <8 minutes for cardiac arrest) in major urban centers [6].
- Digital transformation: Implementing unified dispatch systems and electronic patient records to ensure data continuity [7].
- Workforce nationalization: Replacing a historically expatriate-heavy workforce with qualified Saudi nationals to ensure cultural competence and long-term sustainability [1].

These strategic drivers have fundamentally altered the daily reality of paramedics. They are no longer isolated responders but are integrated nodes in a digital, data-driven healthcare network, accountable for clinical quality metrics that are monitored at the highest levels of government [8].

2. Professional Framework

2.1 The Regulatory Landscape

The practice of EMS in Saudi Arabia is regulated by the Saudi Commission for Health Specialties (SCFHS), which governs licensure, accreditation, and professional classification [9]. The SCFHS plays a pivotal role in defining the boundaries of practice for different tiers of EMS providers, ensuring that public safety is maintained through rigorous examination and certification processes [10]. This governance structure is crucial for distinguishing between the various levels of care providers within the SRCA.

2.2 Distinguishing Roles: EMT vs. Paramedic

A common misconception in public discourse is the interchangeable use of "EMT" and "Paramedic." However, in the Saudi context, these represent distinct professional tiers with vastly different scopes of practice, educational requirements, and clinical responsibilities.

2.2.1 Emergency Medical Technician (EMT)

The EMT represents the foundational level of pre-hospital care.

- Education: Typically requires a diploma or certificate program ranging from one to two years [11].
- Scope of practice: EMTs are trained in Basic Life Support (BLS). Their primary focus is on non-invasive interventions. This includes cardiopulmonary resuscitation (CPR), the use of Automated External Defibrillators (AEDs), basic airway management using adjuncts such as oropharyngeal (OPA) and nasopharyngeal (NPA) airways, bleeding control through direct pressure or tourniquets, and spinal immobilization [11].
- Role in SRCA: EMTs often staff Basic Life Support (BLS) units or assist paramedics in Advanced Life Support (ALS) units. Their role is critical in "scoop and run" scenarios where rapid transport is the priority, or in mass casualty incidents where basic stabilization is needed for a large volume of patients [12].

2.2.2 Paramedic (EMS Specialist)

The paramedic, often referred to as an EMS Specialist in the Saudi classification system, represents the advanced tier of care.

- Education: Requires a Bachelor's degree (BSc) in Emergency Medical Services, typically a four-year program plus a mandatory internship year [11].
- Scope of practice: Paramedics operate under Advanced Life Support (ALS) protocols. Their scope extends to invasive procedures that were traditionally the domain of physicians. This includes advanced airway management (endotracheal intubation and supraglottic airway devices), vascular access (intravenous and intraosseous cannulation), administration of critical medications such as epinephrine (for cardiac arrest and anaphylaxis), amiodarone or lidocaine (for arrhythmias), analgesics, and fluids, interpretation of 3-lead and 12-lead ECGs to identify STEMI (ST-Elevation Myocardial Infarction) and arrhythmias, and needle decompression for tension pneumothorax [12-14].
- Role in SRCA: Paramedics are the clinical leaders on scene. They are responsible for complex decision-making, such as determining whether to initiate resuscitation, identifying stroke alerts for hospital pre-notification, and managing critically ill patients during transport [15].

2.2.3 Senior Specialists and Fellows

The SCFHS has introduced higher tiers, such as the Senior EMS Specialist, who typically holds a master's degree or a fellowship in EMS or Disaster Medicine [9]. These individuals are trained for leadership roles, including medical direction, disaster response management, and critical care transport (e.g., air ambulance operations). They bridge the gap between pre-hospital care and emergency medicine consultants, providing medical control and oversight.

2.3 The Role of Nursing in Pre-Hospital Care

While paramedics form the backbone of the ground fleet, nursing professionals play a vital, specialized role within the SRCA and the broader pre-hospital ecosystem, particularly in high-acuity and mass-gathering contexts.

2.3.1 Flight Nurses (Air Ambulance)

The SRCA operates an air ambulance fleet to cover Saudi Arabia's vast geographic area. Nurses in this domain are often classified as flight nurses or critical care transport nurses [16].

- Scope and training: Flight nurses possess advanced training in critical care (ICU/ED experience) and aviation physiology. They are authorized to manage complex patients requiring hemodynamic monitoring, ventilator management, and vasoactive infusions during transport.
- Operational role: They work alongside paramedics or physicians on helicopters and fixed-wing aircraft, responding to highway accidents in remote areas or facilitating inter-facility transfers of critically ill patients.

2.3.2 Critical Care Transport (Inter-Facility Transfer)

With the regionalization of healthcare services (e.g., stroke and trauma centers), the need for safe inter-facility transfer (IFT) is growing [17].

- Integration: The Ministry of Health and SRCA collaborate on Critical Care Transport (CCT) policies. CCT teams are often multidisciplinary, including a nurse and a paramedic.
- Clinical value: The nurse's role is crucial for maintaining continuity of care for ICU patients moving between hospitals, including ongoing transfusions and complex medication regimens.

2.3.3 Seasonal and Volunteer Nursing (Hajj and Umrah)

During the Hajj pilgrimage, the SRCA's workforce swells significantly with the addition of seconded staff and volunteers [18].

- Deployment: Thousands of nurses from the Ministry of Health and other sectors are seconded to support SRCA operations in the Holy Sites. They staff temporary seasonal health centers and mobile units.
- Scope: In this context, nurses provide triage, administer vaccinations, manage heat-related illnesses (heatstroke/exhaustion), and provide wound care. Their presence allows paramedics to focus on rapid transport while nurses manage on-site stabilization and public health interventions.

2.4 Workforce Demographics and Nationalization

A critical aspect of the SRCA's evolution is the Saudization of its workforce. For decades, the Authority relied on expatriate paramedics to fill the skills gap. While these professionals provided high-quality care, language and cultural barriers sometimes hindered effective communication with the local population [19]. The establishment of dedicated EMS colleges in Saudi universities has created a pipeline of domestic talent, producing large numbers of Saudi paramedics annually [20]. This localization strategy is a clinical quality intervention, improving communication, cultural congruence, and patient trust during emergencies [21].

3. Educational Infrastructure and Competency Development

3.1 The Academic Shift: From Vocational to Professional

The quality of pre-hospital care is inextricably linked to the quality of education provided to the workforce. In the past, EMS training in Saudi Arabia was largely vocational, focusing on psychomotor skills. The transition to university-based education marks maturation of the profession. Bachelor of Science (BSc) EMS programs are designed to meet international standards; for example, the College of Applied Medical Sciences adopted and locally adapted the Flinders University curriculum [22].

3.2 Advanced Training and Fellowships

To support higher tiers of practice, the SCFHS and universities have developed fellowship programs, including the EMS and Disaster Medicine Fellowship. This pathway prepares senior practitioners for systems design, medical oversight, disaster medicine, and public health integration [9].

3.3 Continuous Professional Development (CPD)

To maintain licensure, paramedics and EMTs must fulfill Continuing Medical Education (CME) requirements mandated by the SCFHS. Training commonly emphasizes maintaining core certifications and periodic skills refreshers [23]. The SRCA conducts internal training initiatives; in 2021 it collaborated with the Global First Aid Reference Centre to train instructors on updated IFRC resuscitation guidelines [24].

3.4 Identified Competency Gaps

Despite robust educational frameworks, literature identifies competency gaps requiring reinforcement. Survey evidence indicates lower recognition of non-traditional/posterior circulation stroke presentations compared with classic FAST symptoms [25]. Additional evidence suggests that ECG interpretation accuracy for complex arrhythmias and ischemia requires strengthening in some cohorts [26].

4. Operational Performance

4.1 Response Time: The Critical Metric

In emergency medicine, time is tissue. Response time—defined as the interval between receipt of a call at dispatch and ambulance arrival on scene—is a primary SRCA KPI. Urban response times have improved, while rural response times remain longer due to geographic scale and resource distribution [27,28].

- Urban improvements: In major hubs such as Riyadh, Jeddah, and Dammam, average response times have improved to approximately 12–15 minutes [27].
- Rural challenges: Disparities persist in rural areas, where response times can average 20–30 minutes or more [28].
- Interventions: Fleet diversification (e.g., motorcycle response units) and expansion of air ambulance services for remote critical cases.

4.2 Cardiac Arrest Outcomes

Out-of-hospital cardiac arrest (OHCA) outcomes depend on the chain of survival. SRCA paramedics deliver advanced resuscitation care, including airway management and indicated medications, consistent with established protocols [12]. However, outcomes remain strongly influenced by bystander CPR rates, which are comparatively low nationally [29]. SRCA-led community initiatives aim to strengthen the early links in the chain of survival [30].

4.3 Trauma Care and the "Platinum Ten Minutes"

Trauma—particularly from road traffic accidents—remains a leading cause of death in Saudi Arabia [31]. SRCA trauma strategy emphasizes rapid assessment, immediate life-saving interventions, and expedited transport. Key interventions include hemorrhage control, spinal motion restriction, and needle decompression when indicated [12]. Preventable mortality remains an important quality target [2,32].

4.4 Stroke and Acute Coronary Syndrome (ACS)

For time-sensitive conditions such as stroke and acute coronary syndrome, pre-hospital recognition and destination decision-making are central. Many stroke patients continue to self-present, delaying definitive therapy [33,34]. For ACS, 12-lead ECG acquisition and pre-notification can reduce reperfusion delays, although implementation is not yet uniform [35].

5. Technology and Digital Transformation

5.1 The "Assefny" Application

In an era of ubiquitous smartphone usage, SRCA launched the "Assefny" application to modernize emergency access [36]. The application supports GPS-based location accuracy, multilingual access, and interfaces for deaf and mute users. Evidence suggests it can reduce delays related to location description and support dispatch efficiency.

5.2 Electronic Patient Care Records (ePCR)

SRCA has transitioned from paper-based documentation to electronic patient care records (ePCR), enabling structured case data capture and audit-and-feedback quality improvement [37]. Full interoperability with hospital electronic health records remains an ongoing objective to enable longitudinal outcome tracking.

5.3 Computer-Aided Dispatch (CAD)

Computer-aided dispatch supports real-time unit tracking and optimal resource allocation, contributing to system performance and response time improvement [38].

6. Barriers and Challenges to Quality Improvement

6.1 Linguistic and Communication Barriers

Saudi Arabia's diverse population includes residents, expatriate workers, and mass-gathering pilgrims, creating a complex communication environment [39]. Miscommunication during emergencies and handovers can disrupt continuity of care and contribute to delays and errors.

6.2 Ambulance Offload Delays (AOD)

Ambulance offload delay occurs when emergency departments cannot promptly accept patients, reducing ambulance availability and degrading system coverage [40]. Limited real-time interoperability between hospital capacity and SRCA dispatch can exacerbate this challenge.

6.3 Rural–Urban Disparities

Urban centers frequently have greater ALS unit density and access to training, while rural regions face longer response and transport intervals and reduced CPD access, contributing to outcome differences in time-critical emergencies [41].

6.4 Public Awareness and Cultural Factors

EMS effectiveness depends on public activation. Persistent reliance on private transport and limited bystander CPR engagement can weaken the pre-arrival chain of survival and delay definitive care [42].

7. Recommendations for Enhancing Care Quality

1. Unified national medical control: Establish standardized medical control across regions and implement robust audit-and-feedback mechanisms.
2. Bridging the rural gap: Deploy mobile simulation training units to rural regions to maintain competence in low-frequency high-acuity skills.
3. Standardized clinical handovers: Mandate structured handover tools (e.g., ISBAR or IMIST-AMBO) to reduce information loss at transitions of care.
4. Public-centric engagement: Launch national EMS literacy campaigns emphasizing 997/Assefny use and hands-only CPR.
5. Data integration for outcome tracking: Accelerate interoperability between SRCA ePCR and hospital systems to track outcomes beyond response time.
6. Specialized paramedic pathways: Develop community paramedicine and dedicated critical care transport tiers to optimize system performance.

CONCLUSION

This study, entitled "The Role of Nurses and Paramedics in Improving Continuity of Care from the Scene of the Accident to the Emergency Department," demonstrates that continuity of care in emergency medicine is not a single transfer event, but a dynamic, integrated clinical process that begins at the scene and extends seamlessly into the emergency department (ED). Contemporary evidence consistently indicates that the most critical threats to patient safety arise during transitions of care, particularly those involving incomplete information transfer, variability in clinical priorities, and fragmented decision-making between prehospital and in-hospital teams. The findings underscore the pivotal and complementary roles of nurses and paramedics in safeguarding continuity of care. Paramedics contribute essential early assessment, stabilization, and time-sensitive interventions, while emergency nurses ensure rapid reassessment, prioritization, and integration of prehospital data into definitive in-hospital

management. When these roles are aligned through structured communication, shared clinical frameworks, and mutual professional accountability, patient outcomes improve measurably in terms of safety, efficiency, and clinical effectiveness.

Recent international guidelines and systematic reviews highlight that standardized handover tools, interprofessional training, and protocol-driven collaboration significantly reduce information loss and clinical errors during prehospital-to-ED transitions. Moreover, team-based handover models and the use of structured communication frameworks (such as SBAR/ISBAR) have been shown to enhance situational awareness, improve clinical decision-making, and strengthen a culture of patient safety across emergency care systems.

From an organizational perspective, the study emphasizes that effective continuity of care cannot rely solely on individual competence. Rather, it requires integrated systems that support shared documentation, pre-arrival notification, aligned clinical pathways, and continuous quality improvement initiatives. Investment in joint education programs, simulation-based training, and digital solutions for real-time data transfer represents a strategic priority for modern emergency care.

In conclusion, strengthening collaboration between nurses and paramedics is a cornerstone of high-quality emergency medicine. By promoting structured communication, interprofessional respect, and system-level integration, healthcare systems can substantially enhance continuity of care from the accident scene to the emergency department. Such integration not only improves patient outcomes but also reinforces the resilience, efficiency, and safety of emergency care delivery, positioning interprofessional collaboration as a fundamental pillar of contemporary and future emergency health systems.

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